Work Plan for Transportation Modeling Practice at NCTCOG

Prepared for TMIP

by

Arash Mirzaei, P.E.
Travel Model Development Program Manager
NCTCOG

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Presentation Contents

1. Brief overview of current activities of Travel Model Development Group (TMDG) at NCTCOG
2. Status of the current travel modeling system
3. Vision for future model development plan, including time and budget
   - Surveys
   - Model developments
   - Supporting tools

Outline

- Our Current Work
  - Users
  - Requests
  - 2007 status of modeling system
- Our Future Plans
  - Models
  - Databases
  - Tools
  - Surveys
  - Schedule and Resources (CompletePlan)

TMDG Current Work

Modeling Services Users

- Internal Customers
  - Air Quality Planning and Operations Group
  - Transportation Planning Group
  - Congestion Management, Safety and Security Group
  - Demographics and Goods Management Group
  - Transportation Improvement Program (TIP)
- External Customers
  - Local Governments (Cities, Counties)
  - Transportation & Land Use Consultants
  - Transit Agencies (DART, T, DCTA)
  - TxDOT
  - NTTA

Modeling Services Requests

1. Land use/Demographic Forecast integrated with economic and transportation
2. Sustainable Development/TOD
3. Parking Study
4. Truck Modeling and Goods Movement Analyses in Planning
5. HOV Analysis
6. Toll Revenue Analysis
7. Congestion Pricing
8. EJ Analysis
9. Emission Analysis
10. Noise Analysis
11. TCM Credits for Conformity Analysis
12. Transit Planning, Ridership Forecast
13. Transit Revenue
14. New Starts
15. Thoroughfare Planning
16. Emergency Planning using Transportation System
17. Evacuation Planning
18. Ability to Expand Detail Modeling

Not currently addressed in the model (6)

Partially addressed in the model (12)

2007 Status

- Tools
  - RTM is very stable in TransCAD 4.8
  - Transit coding tools are complete and stable
  - Roadway QA tools are complete and stable
  - Traditional report writers (Perf, Transit, LOS, ...) are complete
  - File management system is complete and reliable
- Documentation
  - RTM description document is complete
  - Validation 1999 reports are complete

2007 Status (cont)

- Training
  - Training for use of RTM is complete
  - Documents and training presentations are available on Intranet
  - MUG meetings are regularly scheduled and have high interest
- Hardware
  - The lab is well equipped
  - Archive system is established
  - Backup system is in place
  - Recovery and restore systems are operational

Hours Spent on Projects - Oct ‘06 to March ‘07

Project Type	**% Hours Spent**
Long-Term Projects of TMDG	38%
Short Term Projects of TMDG	33%
Short Term Projects for Other Groups	12%
Administrative	17%

Long-Term Projects of TMDG (38%)

- Training & Model Users Group workshops (MUG)
- Model support
- File management
- TransCAD lab hardware
- Professional development
- Team management

Short Term Projects: TMDG (35%)

- Model improvements
  - Model diagnostic and update 2004
  - Summit and new starts considerations
  - Comparative reports
  - Automated executive reports
  - Modeling area expansion
  - Sensitivity testing
  - TOD transit model development
- Traffic simulation
- Model implementation
  - Transition to TransCAD 5.0
  - Re-batching the model

Short Term Projects: Other Groups (12%)

- Transit
  - DART Model Support
  - DCTA New Starts (Transit)
  - DART Onboard Survey Support
- Congestion Management
  - ICM Project
  - POD Location Skim
- Demographics: Skims for Demographic 2040
- TIP: Toll Revenue by County

Support for Management Activities (17%)

- Administrative
- Committees
- Leave (Holiday/Vacation/Sick)

TMDG Goal: Models

Models Needed

- Land use model
- Person travel model
- Commercial travel model
- Regional multi level travel model to cover 12 counties

Land Use Model (LUM): Features

- Model features
  - Accepts control totals and policies for developments
  - Considers effect of transportation mode (e.g. Car ownership)
  - Sensitive to accessibility measures from travel model
    - Roadway (HOV, toll, managed)
    - Transit (bus, rail, BRT, PNR)
    - Bike/pedestrian
  - Sensitive to development policies
    - Zoning
    - Tax
    - Pricing
  - More TBD

Land Use Model: Input & Output

- Input
  - Control totals for population and employment
  - Transportation network
  - Land availability
  - Development policies
- Output (in large zone level)
  - Population (in important sub-group)
  - Employment (in important sub-group)
  - # Households / families
  - Median income
  - More TBD

Person Travel Model: Features

- Model features
  - Population generator – generates households & family details for each zone, workers, car ownership, and more TBD
  - Activity/trip generator
  - Time and duration of activity
  - MC & DC for important market segments (toll, managed lane)
  - DTA (signals, queuing, ITS, toll)
  - Transit assignment
  - Trip data for important market segments
  - Effect of accidents
  - Sensitive to operational devices
  - Capable of demand management testing
  - Compatible for traffic micro simulation for any sub-area

Person Travel Model: Input & Output

- Input
  - LUM output
  - Small zone structure
  - Transportation networks (roadway, truck, rail, transit, Bike/Ped)
- Output
  - Travel activities of individual persons or major groups: (vehicle ownership, TOD, mode, purpose, activity duration, more TBD)
  - Traffic volume by class (income, vehicle class, TOD)
  - LUM inputs

Commercial Travel Model: Features

- Model features
  - Tour-based
  - Goods and services delivery
  - Effect of hubs and depots at transfer stations
  - Fleet allocations
  - TBD

Commercial Travel Model: Input & Output

- Input
  - LUM output
  - Small zone structure
  - Transportation networks
  - Statewide analysis model (perhaps)
- Output
  - Travel tours for trucks
  - Truck volume (lightweight, heavy truck, TBD)
  - EI, IE, EE tables

Operation of the Models

- Full feature model run will run in order of days and produces the finest detail of the model output
- Project level runs will be customized to run in shorter periods based on the required analysis
  - For example, 20 class assignment is not needed for thoroughfare planning
- Computer hardware – A lab with distributed capabilities will be built for the model
- Storage solution is already designed and scalable
- Sub-area analysis of model is doable in all steps of model
- The model & network are compatible for sub-area traffic measures

Work Plan for New Model Creation

- Initial preparation
  - TMDG conducts user and stakeholder meeting to determine the needs
  - TMDG provides historical perspective of model application for guidance (to reduce the abstraction of the model for users)
  - TMDG converts the needs to model features and structure
  - TMDG performs investigation and conducts peer reviews to design the model framework
- Framework
  - TMDG breaks the framework into model components with I/O that can be outsourced for development
  - Outsourcing of model components happens sequentially with significant overlap to limit the length of development
  - Different contracts for each component (perhaps)

Work Plan for New Model Creation (con't)

- TMDG is responsible for connecting the components and creating a functional model
- Timeline
  - Surveys – 2 years
  - Core model development – 2.5 years
  - Reporting tools, application interface, diagnostic reports – 1 year

TMDG Goal: Databases

Databases Connected to the Model

- Roadway network – fully rectified roadway network with signal location and ITS data
  - Coding process needs to ensure quality assurance
  - Coding should be done in database as soon as construction project plans are ready (master network)
  - Coding environment should be 100% compatible and convenient to use with other components of the information system
- Transit network – fully rectified transit network with bus operation and schedule
  - Inventory data for each year needs to be kept in database
  - Coding system should be simplified in process
  - Fleet data needs to be kept as well

Databases (con't)

- TIP – GIS-based network
- Counts and surveys – A coordinated effort for data collection and database management is highly needed
  - For example, for every project that NCTCOG funds, data format should be already identified in RFP

TMDG Goal: Tools

Modeling Tools Needed

- Roadway– coding tools need major overhaul. Idea of master network seems doable
- Transit– major modification after master network implementation is necessary
- Reporting – models (LUM, PTM, CTM) need extensive reporting capabilities
- Comparative – necessary to capture different model runs' output efficiently
- Diagnostic – necessary to inform the analyst of odd model output and inputs

TMDG Goal: Surveys

Surveys Needed

- Household survey (2008, 2009)
- Transit onboard surveys (2007, 2008)
- External survey (2009)
- Airport (2009)
- Workplace (2009)
- Parking (2009)
- Time-of-day counts (2009)
- Time-of-day speeds (2009)
- Commercial vehicles (2010)

Survey Descriptions

- Household survey in 2008 or 2009
  - It may feature market-based sampling to avoid new surveys for airport, transit, or other markets that the general survey normally under samples
  - Future model structures and needs are formally determined before the survey is done
  - How the survey is done is determined based on available technology
  - We may perform a low budget pilot test to test the new technology
  - Options
    - TxDOT system
    - Adding to NHTS samples (deadline passed)
    - Conducting our own

Survey Descriptions (pg 2)

- Transit onboard surveys
  - DART 2007
  - FWTA 2008
  - DCTA 2008
- External survey
  - TxDOT 12 county 2004 is done. Some additional survey may be needed
- Airports survey
  - Depends on household survey method and funding
- Workplace survey
  - The need should be investigated within the new model structure. Funding from other sources may be available
- Parking inventory and use survey

Surveys Descriptions (pg 3)

- Time-of-day counts
  - Ideally, same year as household survey
  - Locations should be identified as model framework is designed
  - Classification of vehicles
  - After first major data collection, annual surveys need to be scheduled for smaller samples
  - ITS may provide clean data for freeways
- Time-of-day speeds
  - Same as counts
- Commercial vehicles

The Future Plan: CompletePlan

Future Plan (CompletePlan)

- CompletePlan is the fastest possible plan
  - Duration: 4.5 years (3/2007 to 10/2011)
- Requirement
  - Resources are allocated with no restrictions
- What is included
  - Cost and time estimates for major items
  - A complete working model plan
  - Documentation
- What is not included
  - Training
  - Hardware

CompletePlan: Cost Summary

	Cost (for 4.5 yr)	% Total	Avg. Annual Cost
Total	$12,441,650	100%	$2,764,811
Staff*	$5,641,650	45%	$1,253,700
Outsource	$6,800,000	55%	$1,511,111
Do Nothing	$2,938,950	24%	$653,100
Plan Addition	$9,502,700	76%	$2,111,711

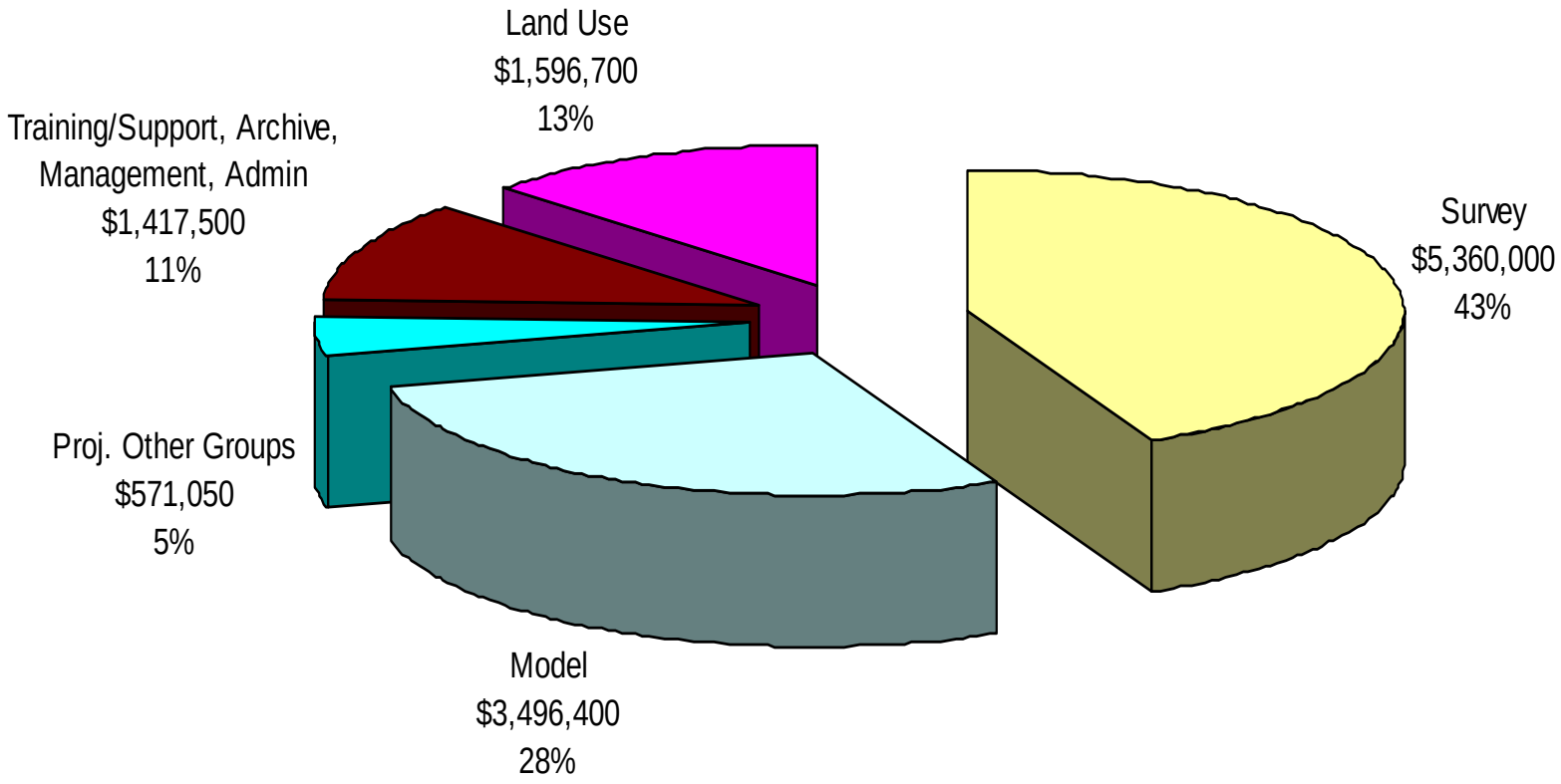
*Staff cost is based on $67.5/hour including 1.33 OH

CompletePlan: Cost Summary*

Category	Total Cost	Percentage
Survey	$5,360,000	43.08%
Model	$3,496,400	28.10%
Projects for Other Groups	$571,050	4.59%
Training/Support, Archive, Management, Admin	$1,417,500	11.39%
Land Use	$1,596,700	12.83%
TOTAL	**$12,441,650**	**100.00%**

*** CompletePlan costs are generated from 2007 – 2011.**

CompletePlan: Cost Summary



CompletePlan: Cost Breakdown

(in Thousands)	Outsource	Staff	Total
Survey	$4,550	$809	$5,359
Model Development	$2,250	$3,122	$5,372
Ongoing Activities	-	$1,707	$1,707
Total	$6,800	$5,638	$12,438

Survey Cost Breakdown

(in Thousands)	Outsource	Staff	Total
Household	$2,000	$315	$2,315
DART Onboard	$350	$35	$385
FWTA & DCTA Onboard	$400	$73	$473
Airport	$300	$88	$388
Workplace	$300	$88	$388
Parking	$200	$70	$270
Count & Speed	$500	$70	$570
Commercial Vehicle	$500	$70	$570
Survey Total	$4,550	$809	$5,359

Model Development Cost Breakdown

(in Thousands)	Outsource	Staff	Total
Short Term	-	$1,123	$1,123
Land Use	$1,000	$597	$1,597
Framework	-	$105	$105
Population Synthesis	$250	$105	$355
Activity Based Model	$600	$211	$811
Commercial Veh. Model	$400	$140	$540
Dynamic Traffic Assign.	-	$281	$281
Model Integration	-	$560	$560
Model Dev. Total	$2,250	$3,122	$5,372

Ongoing Activities Cost Breakdown

(in Thousands)	Outsource	Staff	Total
Proj. for Other Groups	-	$290	$290
Support & Mgmt	-	$1,417	$1,417
Ongoing Act. Total	-	$1,707	$1,707

CompletePlan: Staff Manpower Summary

	Cost (4.5 yr)*	% Total	Avg. Annual Cost
Model Related	$2,474,550	41%	$ 549,900
Model Support	$1,715,850	29%	$ 381,300
Outsource QA	$1,161,000	20%	$ 258,000
Other	$ 290,250	10%	$ 64,500
TOTAL	$5,641,650	100%	$1,253,700

	Manpower	Avg. Annual Manpower
Person Hour	83,580	18,573.33
Person Year	41.2	9.15

*Staff cost is based on $67.5/hour including 1.33 OH